Perceived Technology Acceptance and Software Engineering Factors towards Intention to Use Web-Based Health Information Service (WBHIS)

Siti Noraini Mohd Tobi, Erne Suzila Kassim, Saadiah Juliana Saadun

Faculty of Business and Management, Universiti Teknologi MARA, Puncak Alam, Malaysia
*Corresponding Author: snoraini7601@uitm.edu.my

Abstract: The paper investigates the intentional use of a Web-based Health Information Service (WBHIS) through multi-factors influencing the use of a national, MyHEALTH Portal (MHP). The study utilized an online web-survey incorporates three interrelated aspects of investigation; acceptance influence, socio-cognitive, and software engineering factors (user interface and data quality), to investigate deeper on Malaysian health consumers' intent to adopt the portal. Findings have shown health consumers' intention to use MHP is positively influenced by the positive behavioural attitude of health consumers' towards the portal. The study also supported the significant role played by software engineering factors; user interface design and data quality towards health consumers' attitude of the portal. The results would assist Malaysia Health Education Division in gaining better insights into the design of a well-accepted WBHIS where specifically, the findings would improve the presence and functions of the MHP. This effort is evidently significant in helping the country to reach the 11th Malaysia Plan through its strategy to encourage health awareness and healthy lifestyle activities among its citizens.

1. Introduction

The concept of ehealth has gained momentum within health care in recent years, but surprisingly little has addressed the issue of health promotion within ehealth. The approach of ehealth through the use of the internet to retrieve health information has becoming the center from which an individual acquires knowledge to make informed decisions regarding his health. The main highlight of the study is on Web-based Health Information Service (WBHIS) which has been created to educate the health consumers regarding health issues. WBHIS is an example of online health education which is operated under the pillars of ehealth. It is said that delivering effective and cost-effective interactive health promotion interventions would be greatly facilitated by increased reliance on ehealth applications and such case is the WBHIS (Marcus, et.al., 2000).

In a wider context, the decrements of individuals' health quality associated with unhealthy lifestyles and environments have caused many of todays and tomorrows leading causes of death, disease and disability in the world. This has resulting to an innumerable number of incidents of the non-communicable diseases (NCDs) such as cardiovascular disease, cancer, chronic lung diseases and many more. In 2012, NCDs are recognized as the major causes of admissions and deaths in Malaysia government hospitals. As a matter of fact, the non-communicable diseases also had contributed to an estimated 73 percent of total deaths in Malaysia, with the biggest contributor being cardiovascular diseases that include heart attacks and strokes (. Whilst, an estimated 35 percent of deaths occur in individuals aged less than 60 years which are mainly the working population (MOH, 2015). Thus, the overall increasing or high prevalence of these three major non-communicable diseases risk factors will increase the burden of disease of non-communicable diseases in Malaysia. The non-communicable disease is already the main cause of death in Malaysia and the biggest contributor in terms of disability life-years (Noor, et.al., 2014). The number of patients diagnose with non-communicable diseases will continue to rise and they will seek treatment at all levels of care. With the increasing economic pressure Malaysia is facing currently, it is expected that many more will turn to the public healthcare sector for treatment. To overcome this,

Corresponding Author: Siti Noraini Mohd Tobi, Faculty of Business and Management, Universiti Teknologi MARA, Puncak Alam, Malaysia. Email: snoraini7601@uitm.edu.my

the adoption of healthy lifestyles and environments are the key elements of such preventive actions and to uphold the health promotion and education through WBHIS such in this study, the MHP.

Furthermore, it is crucial to study individuals' attitude and their behavioural intention towards health behavioural activity as individuals' behaviour is predicted by their attitude toward the particular behaviour and how they think other people would view them if they did the actual behaviour (Ajzen, 1991). Both these factors seem to determine individuals' behavioural intention, which leads to whether the actual behaviour will be carried out in the future or otherwise. This study tries to respond to the above said health issues by understanding what it takes to create health empowered community towards becoming healthier society. In simplest way, what causing them to use MHP. Therefore, it is the goal of the study to examine the critical success factors that influence health consumers' attitude and their intention to use MHP. Specifically, the study seeks to answer the following research questions:

i What is the relationship between technology acceptance factors and health consumers' attitude in using MHP?

ii What is the relationship between software engineering factor and health consumers' attitude in using MHP?

iii What is the relationship between health consumers' socio-cognitive aspect and their intention in using MHP?

2. Literature Review

Empirical findings relating to several constructs being investigated in the study are discussed. Among others are, previous findings of TAM'S model within WBHIS that include constructs - PEOU and PU. Besides that, the socio-cognitive factors relating to the intention to use WBHIS also were highlighted followed with the role of software engineering factors comprise of user interface and data quality towards WBHIS usage intention among Malaysian health consumers. Before further discussion is provided, a review of government health portal and MHP is provided.

2.1. Government Health Portal

Governmental health portals and websites provide quality, reliable and trusted health information for its citizens to help them making healthy and informed choices anywhere and at any time. Likewise, throughout these, an individual can quickly search for a topic, or look into specific areas accountably in more detail such as: managing conditions and diseases, coping with life stages and general advice on health and wellbeing. Table 1. provides some examples of governmental health information portals that are available online.

Table 1.   Examples of Governmental Health Information Websites and Portals

Country	Portal	Web address	Managing Department
United States of America	Healthfinder.com	www.healthfinder.gov.au	U.S. Department of Health and Human Services
North America	Medline Plus	http://www.nlm.nih.gov/medlineplus/	U.S. National Library of Medicine
United Kingdom	The National Health Service (NHS) Choice	http://www.nhs.uk/	U.K. Department of Health
Australia	Better *Health*	www.betterhealth.vic.gov.au	Victorian Government's, Department of Human Services
	Health *direct*	www.healthdirect.gov.au	Commonwealth Government of Australia
	Rural *Health*	www.ruralhealth.gov.au	Australian Government Office of Rural Health
	Department of Health and Ageing's website (DHA)	www.health.gov.au/	Australian Government Department of Health and Ageing
	Medicine Australia (MedAu)	www.medicineau.net.au	Northern Rivers Division of General Practice (NSW) Ltd
	Health *Connect*	http://www.healthconnect.gov.au/	Australian Editorial Committee of Medical Practitioners
Malaysia	MyHEALTH Portal	http://www.myhealth.gov.my	Health Education Division, Ministry of Health

2.2. MyHEALTH Portal (MHP)

MHP is a national WBHIS set up by the Ministry of Health Malaysia (MOH) in 2005. It is one of the national initiatives by the Malaysia Government to bring great advances to the country through the innovative use of Information and Communication Technology (ICT) to enable accurate, appropriate and up-to-date information on health. The main functions of MHP is to provide online health information for Malaysians and become a source of comprehensive, credible, accurate and latest information on health covering prevention, treatment and rehabilitation developed by local health and medical experts.

The number of hits for the portal was reported to rise yearly. In its early years such as in 2006, the number of hits for the portal was reported 198, 271 before decreased slightly in 2007 with around 137, 226 hits. However, in 2013, the number started to jump to 1 million hits and steadily rise every year. Table 2. shows the statistics of MyHEALTH Portal usage from the year 2006 until 2017 (MHED, 2018).

Table 2. MyHEALTH Portal's Statistics from Year 2006-2017

Year	Hits	Year	Hits
2006	198, 271	2012	728, 376
2007	137, 226	2013	1, 263, 710
2008	257, 702	2014	1, 943, 644
2009	176, 154	2015	1, 868, 917
2010	552, 992	2016	1, 567, 961
2011	583, 806	2017	9, 629, 766

2.3. Factors that Influence WBHIS Usage

Behaviours have been shown to be an important factor for the existence or maintenance of the health problem. In that case it is essential to analyze the determinants that lead to the behaviour. The determinants can be from multiple aspects ranging from as early as the systematic designing phase comprising the software engineering aspects to socio-cognitive influences (Limayem, et. al., 2003; Laerum, et. al., 2001; Atkinson, et. al., 2009). A key indicator of success is whether a user would use the portal again (Chang, et. al., 2014). If the sponsors of health information portals want to attract a wider audienceand draw health consumers away from search engines such as Google then, attention has to be paid to the elements that improve users' search experience (Fisher, et. al., 2009). There are great number of empirical studies investigating well-known inhibiting factors of user's acceptance towards ehealth technology (Rho, et. al., 2014; Kim, et. al., 2007; Wilson, et. al., 2004; Kim, et. al., 2012). Three aspects that are relevant to the study of health portal as it has been shown influenced health consumers' behavioural intention that are; technology acceptance, socio-cognitive and, software engineering factors (user interface and data quality aspects).

2.4. Technology Acceptance Model (TAM)

With regards to the findings of this theory within WBHIS field, a study had been conducted on the use of online health information service among college students in one Korean university (Ning, et. al., 2014). In the study, the findings revealed there is a significant effect found between PEOU and PU towards usage intention. Moreover, another study to examine the potential predictors of Internet-Health Information Seeking (IHISB) among Korean senior had also found PU and PEOU had positive direct effects on IHISB (Chang, et. al., 2014). Within this study, there is a need to measure the direct effect of MHP-acceptance towards the health consumers' attitude. This is due to apply these aspects to the technology acceptance context, there is a necessary to measure attitudes and beliefs regarding the use of technology rather than attitude and beliefs directed towards the technology itself (Yousafzai, et. al., 2007). This is due to individuals might hold a positive view about a technology without being favorably disposed towards its use. With regards to this, a finding had highlighted that PEOU and PU are the main determinants of the user's attitudes toward the technology in hand and eventually affect consumers' initial intention to use (Montazemi, et. al., 2013).

2.5. Theory of Reasoned Action (TRA)

Within this study, the socio-cognitive factor that directly influence health consumers' intention in using MHP is rooted from the Theory of Reasoned Action (TRA) and it has received wide attention to use as a socio-cognitive model for health websites' usage (Marton, et. al., 2012; Dahlgren, et. al., 2012; Lazard, et. al., 2014). TRA is a model for the prediction of behavioral intention in which besides individual's attitude, another factor that is the experience that they received from people surround them in using the technology will also be the predictor relating their intention to use the technology (subjective norms) (Ajzen, 1991).

Several studies within WBHIS have found the direct effect of attitude on behavioural intention to use health related websites as predicted by the theory (Dahlgren, et. al., 2012; Torres, 2011; Wong, et. al., 2012; Jung, et. al., 2010; Jung, et.

al., 2009; Yun, et. al., 2010; Dahlgren, et.al., 2012) and for instance, a study indicated attitude was identified as the most important positive predictor of WBHIS intention (Dahlgren, et. al., 2012). Meanwhile, an interviews' finding has revealed respondents had a positive attitude towards the use of ehealth services and found them to be useful as the online health guide was perceived as an especially good complement to traditional health care (Jung, et. al., 2010). Similar to attitude studies, subjective norm also was found having direct impact towards behavioural intention for online health promoting activities (Muzaffar, et. al., 2014; Hewitt, et. al., 2007). A study has found subjective norm was significant towards users' intentions to use patient health portal (Torres, 2011). It has been claimed that subjective norm is one of the critical issues for the adoption of personal health records technology among health care users (Jian, et. al., 2012).

2.6. Software Engineering Factors

Within the software engineering field, the social factors which have been linked to the technology adoption are; user interface and data quality aspects (Haslina, et. al., 2005). A well-designed interface is terribly important to users (Haslina, et. al., 2005; Jacob, 2000). The design of the user interface includes any aspect of the system that is visible to the user. Limited studies were found highlighting the effect of interface design towards health consumers' attitude towards using online health websites except in one study (Lazard, et. al., 2014). The findings had revealed design complexity was associated with users' attitude toward the health website. In general, the technology in hand would be much positively accepted if there is a high security of information in terms of authenticity and accuracy of

available information on this health information (Liu, et. al., 2012).

2.7. Behavioural Intention

Intention to use has been established as a good predictor for technology use (Venkatesh, et. al., 2003; Venkatesh, et. al., 2007). While extensive number of behavioural intention studies has been conducted in various contexts of technology, yet in WBHIS studies the intention to use health information refers to the extent to which users tend to apply the obtained health information to their health issues (Ying, et. al., 2014). This is collaboratively supported with recent WBHIS intentional-to-use studies (Chang, et.al., 2014; Ning, et. al., 2014; Marton, et. al., 2012; Wong, et. al., 2012; Jung, et. al., 2010; Muzaffar, et. al., 2014). Based on the discussion, the following hypotheses are offered. The research framework is illustrated in Figure 1.

The hypotheses investigated are;

H_1: Perceived ease of use will positively influence health consumers' attitude towards MHP.
H_2: Perceived usefulness will positively influence health consumers' attitude towards MHP.
H_3: User interface will positively influence health consumers' attitude towards MHP.
H_4: Data quality will positively influence health consumers' attitude towards MHP.
H_5: Attitude will positively influence health consumers' intention toward using MHP.
H_6: Subjective norms will positively influence health consumers' intention toward using MHP.
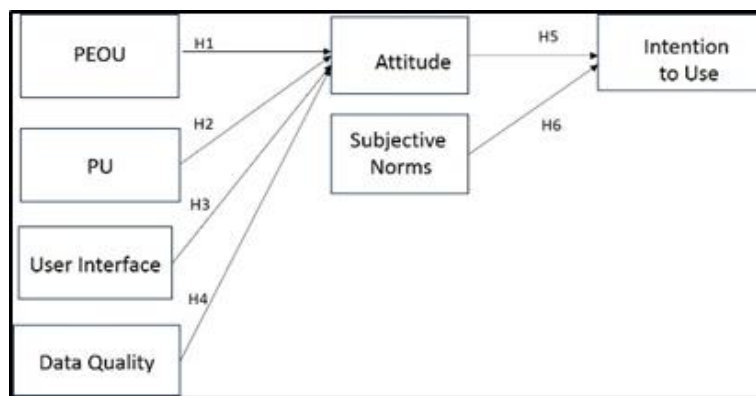

Figure. 1. Research Framework

Based on the framework, this is to identify the acceptance factors that influence users' attitude towards using the

information technology. The acceptance model suggests that when an individual is presented with a new information

technology, their attitude whether to use the technology is based on their perceptions of the technology based on; PEOU and PU (Davis, 1989). Another aspect of investigation is to look on the effect of the software engineering factors; user interface and data quality aspect towards health consumers' attitude which later determine their intention to use MHP. Since it is found lacked in empirical findings, it is expected the study would contribute a significant finding within the field. The final aspect of investigation looks on the prediction of behavioural intention in which, individual's attitude and subjective norms will also be the predictor on intention to use (Ajzen, 1991).

3. Research Methodology

The study was quantitatively conducted and utilized an online web-survey. The identified population for the study is the users of MHP that access the portal at the official URL, www.myhealthportal.gov.my. It only includes users who used MHP during the study is conducted and regardless the number of experiences they had with the portal. A convenience sampling technique which is a type of non-random sampling was selected in recruiting respondents for the study. The minimum sample size for PLS model estimation should at least meet the 10 times rule of the maximum number of arrows pointing at latent variables anywhere in the PLS path model. In another word, 10 times the largest number of structural paths directed at particular construct in the structural model (Hair, et. al., 2014; Hair, et. al., 2017). For the present study, the minimum sample size requirement according to the 10 times rule is 6 * 10 = 60 samples. This study collected 170 complete data samples, which is far larger than 60, the minimum requirement of sample size. The main research instrument used is questionnaire and it was performed via online survey in order to get response from the population representatives. The scale used within the study was on a continuum from 1 to 5. The "1" represents the level of "strongly disagree", and the "5" represents the degree of "strongly agree". This scale was used consistently throughout all constructs investigated within the study. The user measurement for attitude is a modified version instrument (Torres, 2011; Goff, 2016), i.e. I think using *MyHEALTH* Portal is beneficial, I think using *MyHEALTH*

Portal is positive Attitude measured six items while subjective norms contain four items (Torres, 2011). PU-user measurement used an adapted version of the technology acceptance tool and contains four items (Davis, 1989), i.e. the use of *MyHEALTH* Portal is beneficial to improve my health care information searching, the use of the *MyHEALTH* Portal will have a positive impact on my health information searching. Meanwhile, measurement for PEOU is a modified version instrument which contains five items (Seeman, 2009), i.e. learning to operate *MyHEALTH* Portal is easy for me, my interaction with *MyHEALTH* Portal is clear and understandable. Data quality aspect contains eight items emphasize on data accuracy, completeness, sufficiency, understandability, standardization, secureness and timeliness, and user interface design items consist of ten items (Haslina, et. al., 2005), i.e. the characters on the screen of MHP is easy to read, the image of the character in *MHP* is sharp. The study survey was hosted on the official MHP website and the cross-sectional survey of visitors to the *MHP* website were carried out using a link placed on the home page of the website. It is a web-based option-in survey of a convenience sample of respondents using survey monkey online web-survey application. The data was collected from June 13, 2018 to June 25, 2018.

4. Data Analysis

SmartPLS 3.0 statistical software application was used to analyze the data (Ringle, et. al., 2009). A total of 170 participants responded to the survey and out of the responses, 6 responses were found to be incomplete due to respondents stop answering the questionnaire halfway through. It was found, 6 out of 170 responses to be invalid due to cases have suspicious response pattern (straight lining - answered similar scales for all questions). Meanwhile, further 8 responses were deleted due to outliers detected based on the initial perusal of z scores in excess of $> \pm 3.29$. These 8 cases were omitted from the data set for further data analysis and therefore, there were only 150 cases were used in the subsequent analyses.

4.1 Descriptive Statistics

Table 3. highlights the demographic details of the respondents participated in the study.

Table 3. Respondents' Demographic Details

Characteristics	Classification	*N*	Percentage (%)
Gender	Male	94	62.6
	Female	56	37.3
Age	18-20 years	14	9.3
	21-30 years	118	78.6
	31-40 years	18	12
Race	Malay	147	98
	Chinese	3	2

Characteristics	Classification	N	Percentage (%)
State	Selangor	41	27.3
	Johor	18	12
	Pulau Pinang	11	7.3
	Perak	9	6
	Pahang	15	10
	Negeri Sembilan	10	6.6
	Kedah	15	10
	Melaka	11	7.3
	Terengganu	4	2.6
	Kelantan	12	8
	Wilayah P.	4	2.6
Occupational level	Professional	38	25.3
	Support level	27	18
	Student	76	50.6
	Self-employed	7	4.6
	Unemployed	2	1.3

5. Results

5.1. Measurement Model Assessment

A measurement model has satisfactory internal consistency reliability when the composite reliability of each construct exceeds the threshold value of 0.7. Any constructs with the composite reliability between 0.4 to 0.7 should only be removed if only leads to higher AVE value (Hair, et. al., 2011). As a results, two items from ease of use were removed (learning to operate MHP is easy for me, I find it is easy to use *MyHEALTH* Portal to search health information that I want) due to low value-loadings followed with one item from usefulness (the use of MHP have positive impact on my health information searching) and three items from attitude (using *MyHEALTH* Portal is beneficial, using *MyHEALTH* Portal is positive, using *MyHEALTH* Portal would make it easier to access health information). Items measuring user interface indicated a total of six items were removed to cater for >0.5 AVE value and, four items were removed from data quality measurement followed with subjective norms with one item (My friends think I should use *MyHEALTH* Portal) to meet the threshold value of AVE throughout all constructs. The composite reliability of each construct for this study ranges from 0.712 to 0.951 and this is above the recommended threshold value of 0.70. Thus, the results indicate that the items used to represent the constructs have satisfactory internal consistency reliability. A measurement model is said to have satisfactory indicator reliability when each item's loading is at least 0.7 and is significant at least at the level of 0.05 (T-value > 1.96) accounted for 95% confidence interval. After the removal, the PLS algorithm and bootstrap test were rerun and all items finally have demonstrated satisfactory indicator reliability. Following this, the measurement model's convergent validity is assessed by examining its average variance extracted (AVE)

value. After item deletion was made earlier due to low loadings, the new AVE value for all constructs exceeded the recommended threshold value between 0.535 to 0.820. Next, all off-diagonal elements are recorded lower than square roots of AVE, hence the result confirmed that the Fornell and Larker's criterion is met. The HTMT values are clearly lower than the threshold value of 0.9 and neither of the confidence intervals includes the value of 1. The values of lower and upper bound for all relationship are ranging from 0.028 to 0.347. The HTMT values and confidence intervals have confirmed that the third assessments of the measurement model's discriminant validity are satisfied. All model evaluation criteria have been met, providing support for the measures' reliability and validity. This served as the indicator that the measurement model for this study is valid and fit to be used to estimate parameters in the structural model.

5.2 Structural Model Assessment

All constructs-VIF values are below the threshold of 5 (VIF < 5), therefore no collinearity exists. PEOU, PU, user interface and data quality are able to explain 31% of the variance in attitude. Meanwhile, attitude and subjective norms indicate 29% of the variance in intention to use. Following the rules of thumb, the R^2 values of attitude and intention to use (0.310, 0.291) is considered moderate (Hair, et. al., 2011; Henseler, et. al., 2009). The f^2 effect size on endogenous variables are found to be small in most of the constructs such as; user interface, data quality, attitude and subjective (>0.02) while f^2 effect size for PEOU and PU showed no effect (<0.02) (Cohen, 1988). To further examine the model's capability to predict, blindfolding procedure was performed and revealed the Q^2 value of the endogenous construct is considerably above zero which imply predictive relevance (Hair, et. al., 2014; Hair, et. al., 2017). The results of q^2 effect sizes revealed PEOU, PU

have no effect in producing predictive relevance for attitude (<0.02), also subjective norms on intention to use (<0.02). The predictive relevance values of <0.02 in other 3 constructs (user interface, data quality and attitude showed it have small effect size towards endogenous variables respectively. To confirm the significant effect of exogenous variables on endogenous variables despite the effect size and variance, a larger subsample of 5,000 is chosen to ensure the stability of results as suggested (Ringle, et. al.,

2015).
Based on the t-statistics output, the significant level of each relationship is determined. The results indicate that several paths are statistically significant using a two-tailed test (t-value > 1.96) with regards to user interface, data quality and attitude. Table 4. below list the path coefficients, observed t-statistics, significance level values and the confidence intervals for all hypothesized path.

Table 4. Path Coefficients, Observed T-Statistics, Significance Level Values and the Confidence Intervals for All Hypothesized Path

Hypotheses	Relationship	Path coefficient	t Values	P values	Significance (p < 0.05)
H1	PEOU→ Attitude	0.028	0.355	0.723	NS
H2	PU → Attitude	0.094	1.006	0.315	NS
H3	User interface → Attitude	0.214	2.810	0.005	**
H4	Data Quality→ Attitude	0.180	2.275	0.023	**
H5	Attitude → Intention to use	0.182	2.271	0.024	**
H6	Subjective norms → Intention to use	0.147	1.620	0.106	NS

*p<0.05**, NS-Not supported*

5.3 Discussion
The result of predictor-PEOU towards health consumers' attitude was not significant and found inconsistent with previous studies that had examined PEOU and attitude towards using WBHIS (β=0.028, t=0.355, p>0.05). In the studies, PEOU significantly influenced health consumers' attitude towards the use of health care portals (Yun, et. al., 2010). The study examined the relationships of the factors affecting consumers' disease information–seeking behaviour on the Internet in Korea and within the study, PEOU was found to have a positive effect on consumers' attitude towards their use of disease information on the Internet (Yun, et. al., 2010).
The result is not something peculiar as only few numbers of studies within WBHIS had found that PEOU significantly influenced health consumers' attitude towards using the health care portals. This is due to some researchers had ignored this component due to its mediating role towards usage intention Adams, et. al., 1992; Bagozzi, et. al., 1992). Many researchers within the field were found emphasizing the direct impact of PEOU on the behavioural intention of technology adoption without considering the impact of attitude (Chang, et. al., 2014; Ning, et. al., 2014; Wong, et. al., 2012; Jung, et. al., 2010). Predictor-PU also was found not having impact on health consumer's attitude (β=0.094, t=1.006, p>0.05). The result also was not consistent with WBHIS previous studies that had examined between PU and health consumers' attitude (Jung, et. al., 2010; Jung, et.

al., 2009; Yun, et. al., 2010). For instance, a study was conducted on factors affecting consumers' disease information–seeking behaviour on the Internet and the study had found, PU was directly and positively influenced attitude of Korean health consumers (Yun, et. al., 2010).
Meanwhile, the software engineering aspects measured predictor-user interface design where the result revealed it was positively associated with users' attitude toward the health website (MHP) (β=0.214, t=2.810, p<0.05). Limited studies were found highlighting the effect of user interface design towards health consumers' attitude in using online health websites (Lazard, et. al., 2014). Although the effect is considered small, yet this finding has proven that user interface design should be considered an influential variable for health communicators to effectively reach their audiences, as item bodies the critical first step for message evaluation via electronic platforms. Another important predictor investigated under the factor is the data quality aspect embedded within the health portal. It was positively found associated with MHP-users' attitude (β=0.180, t=2.275, p<0.05). Despite the lack of findings supporting this, the result supports (Jones, et. al., 2018) whom argued the quality of data in context of health system is a medium that provide strong health information which are reliable, timely, and good quality enabled to improve health system performance and make evidence- informed decision. In Thailand, China mainland, Taiwan, and Malaysia, the Ministry of Health is responsible through its various

agencies for collecting and managing the health-care data. On the other hand, health insurance is the main institution that collects and stores healthcare data in South Korea and Japan (Aljunid, et. al., 2012).

Meanwhile, predictor-attitude has been identified to have positive influence on health consumer's intention to use MHP (β=0.182, t=2.271, p<0.05). This result is consistent with previous studies that examined users' intention towards WBHIS use (Dahlgren, et. al., 2012a; Wong, et. al., 2012; Jung, et. al., 2010; Jung, et. al., 2009; Yun, et. al., 2010; Dahlgren, et. al., 2012b). In present study, attitude was found as predictor towards users' intention to use MHP. The justification of this result could be based on what had been highlighted that the finding is much influenced with the level of PEOU of the WBHIS (Wong, et. al., 2012). Such in this study, the portal (MHP) is perceived as easy to be used by the users (total mean=4.12). A bootstrap test was performed to predict the relationship between health consumers' subjective norms and their intention to use MHP which finally revealed as did not receive any statistical support (β=0.147, t=1.620, p>0.05). Overall, this study had suggested health consumer's subjective norms does not contribute to their intention to use MHP. This result is consistent with previous studies that had examined subjective norms towards users' intention to use WBHIS (Dahlgren, et. al., 2012a; Dahlgren, et. al., 2012b). However, it is interesting to note that within another discipline of ehealth studies such as in patients' health portal and Health Information Technology (HIT), there were quite significant numbers of empirical supports that had confirmed on the role of subjective norms as predictor. This can be seen in studies relating to intention to use patient health portal where they had found subjective norms were significant towards users' intentions to use the patient health portal (Torres, 2011; Madden, et. al., 1992; Mathieson, 1991; Norman, et. al., 1996; Taylor, et. al., 1995; Venkatesh, et. al., 2001). Similarly, within HIT studies, subjective norms had also significantly found as predictor of HIT intention. For instance, in one study, subjective norms was found as the strongest predictor of pharmacists' high intention of drug monitoring database via web portal (Fleming, et. al., 2014). Although the results were found varies in three different areas of investigation, it is rather unique to understand its phenomenon within WBHIS study where researchers had addressed their concern that subjective norms would not be important and significant within WBHIS intentional study. Their reason is that health information seeking is something considered as private, personal, and of low risk, and unlikely to be subject to others' influence (Yoo, et. al., 2008).

6. Conclusion

This study gives insight that the health consumers' intention to use MHP was positively influenced by the positive behavioural attitude of the health consumers' towards the portal. Despite this, to possess individual positive attitude is

more likely can be derived from good contributor aspects such as the elements inside the portal itself. Thus, this study proved the emerging concern on the role played by the software engineering aspects measuring the user interface design and data quality has provided a landscape of the key elements that should be given particular attention in an information based-service website. It is expected that the federal leadership through its responsible Ministry, in the form of regulation and oversight is needed to ensure the data provided is presented with most accurate, state of the art, quality and up to date health information that lead to national standards for the design, performance and reduce errors. For future study, findings would be more interesting if outputs from the professionals' perspectives are also examined. The professionals consist of the key players in the health promotion area for instances, healthcare consultants, physicians, health educators and the health policy makers with the concern on how the portal could be strategically and maximally utilized by the targeted users. To conclude, this effort is evidently significant in helping the country to reach the national plan, The 11th Malaysia Plan through its strategy to encourage health awareness and healthy lifestyle activities among citizens.

7. Reference

Marcus, B. H., Nigg, C., Riebe, D., and Forsyth, L. H. (2000). Interactive Communication Strategies: Implications for Population-Based Physical Activity Promotion. *Am J Prev Med*. 19, 121–126.

MOH (2015). National Health and Morbidity Survey: NCD, Risk Factors and Other Health Problems. Volume II. Kuala Lumpur: Ministry of Health Malaysia.

Noor, A. D., Mohd, A. O., Ummi, N. Y., and Teh, C. H. (2014). *Burden of Disease Study: Estimating Mortality and Cause of Death in Malaysia*. Putrajaya: Institute of Public Health.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Process.* 50: 179-211.

MHED (2018). *Laporan Dalaman Data Pengunaan MyHEALTH Portal*. Putrajaya: Unit Pendidikan Kesihatan.

Limayem, M., Hirt, S. G., and Cheung, M. K. (2003). *How Habit Limits the Predictive Power of Intention: The Case of Information Systems Continuance.* Retrieved March, 16, 2018, from http://www.misq.org/archivist/vol/no31/lssue4/LimayemHirt.html

Laerum, H., Ellingsen, G., and Faxvaag, A. (2001). Doctor's use of electronic medical records systems in hospitals: cross sectional survey. *BMJ 2001*, 1344-1338

Atkinson, N. L., Saperstein, S. L., and Pleis, J. (2009). Using the Internet for Health-Related Activities: Findings from a National Probability Sample. *J Med Internet Res.* 11(1), e4.

Chang, S. J., and Im, E. O. (2014). A Path Analysis of Internet Health Information Seeking Behaviors among Older Adults. *Geriatric Nursing.* 35, 137-141.

Fisher, J., Burstein, F., Rosetta, M., and Lazarenko, K. (2009). Health Information Portals: How Can We Improve the User's Search Experience? *Proceedings of the 2009 European Conference on Information Systems.* 8-10 June, Verona, Italy: ECIS, 463.

Rho, M. J., and Choil, I. Y. (2014). Predictive Factors of Telemedicine Service Acceptance and Behavioral Intention of Physicians. *International Journal of Medical Informatics.* 83,

559-571.

Kim, J.,and Chang, H. (2007). The Model Predicting Telemedicine Adoption by Physicians: Comparison of Theory of Planned Behavior and Technological Acceptance Model. *Health Service Management.* 1(1), 1-12.

Wilson, E.V., and Lankton, N. K. (2004). Modeling Patient's Acceptance of Provider-Delivered ehealth. *J Am Med Inform Assoc.* 11(4), 241–248.

Kim, J., and Park, H. A. (2012). Development of a Health Information Technology Acceptance Model using Consumers' Health Behaviour Intention. *Journal of Medical Internet Research.* 14(5), 133.

Ning, X., Jiang, Z., and Kim, K. (2014). An Empirical Study on Factors Affecting Usage Intention of Healthcare Information Service among College Students. *International Journal of Engineering and Industries.* 5(1), n.p.

Yousafzai, S. Y., Gordon, R. F. and John, G. P. (2007). Technology Acceptance: A Metaanalysis of the TAM: Part 1. *Journal of Modelling in Management.* 2(3), n.p.

Montazemi, A. R., and Saremi, H. Q. (2013) Factors Affecting Adoption of Internet Banking. *The European Financial Review*, 18-20.

Marton, C., and Choo, C. W. (2012). A Review of Theoretical Models of Health Information Seeking on the Web. *Journal of Documentation.* 68(3), 330 – 352.

Dahlgren, A. A., Bjørndal, A., Jensen, J. O., and Helseth, S. (2012a). Evaluation of a Web Portal for Improving Public Access to Evidence-Based Health Information and Health Literacy Skills: A Pragmatic Trial. *Plos One.* 7(5), n.p.

Lazard, A., and Mackert, M. (2014). User Evaluations of Design Complexity: The Impact of Visual Perceptions for Effective Online Health Communication. *International Journal of Medical Informatics.* 83, 726-735.

Torres, C. A. (2011). Examining the Role of Anxiety and Apathy in Health Consumers' Intentions to Use Patient Health Portals for Personal Health Information Management. Doctor Philosophy, Florida State University, Ann Arbor.

Wong, C. K. M., Yeung, D. Y., Ho, H. C. Y, Tse, K., and Lam, C. Y. (2012). Chinese Older Adults' Internet Use for Health Information. *Journal of Applied Gerontology.* 33, 316.

Jung, M. L., and Loria, K. (2010). Acceptance of Swedish e-health Services. *Journal of Multidisciplinary Healthcare.* 3, 33-63.

Jung, M. L., and Berthon, P. (2009). Fulfilling the Promise: A Model for Delivering Successful Online Health Care. *Journal of Medical Marketing: Device, Diagnostic and Pharmaceutical Marketing.* 9, 243.

Yun, E. K. and Park, H. A. (2010). Consumers' Disease Information-Seeking Behaviour on the Internet in Korea. *Journal of Clinical Nursing.* 19(20), 2860-8.

Dahlgren, A. A., Sørum, R., and Helseth, S. (2012b). Cognitive Factors Predicting Intentions to Search for Health Information: An Application of the Theory of Planned Behaviour. *Health Information and Libraries Journal.* 29(4), 296-308.

Muzaffar, H., Novakofski, K. C., Castelli, D. M., and Scherer, J. A. (2014). The HOT (Healthy Outcome for Teens) Project. Using A Web-Based Medium to Influence Attitude, Subjective Norm, Perceived Behavioural Control and Intention for Obesity and Type 2 Diabetes Prevention. *Appetite.* 72, 82–89.

Hewitt, A. M. and Stephens, C. (2007). Healthy eating among 10–13-year-old New Zealand Children. Understanding Choice using the Theory of Planned Behaviour and the Role of Parental Influence. *Psychology, Health and Medicine.* 12(5), 526–535.

Jian, W. S., Abdul, S. S., Sood, S. P., Lee, P., Hsu, M. H., Ho, C. H., Li, Y. C., and Wen, H. C. (2012). Factors Influencing Consumer Adoption of USB-based Personal Health Records in Taiwan. *BMC Health Serv Res.* 12, 277.

Haslina M. and Sharifah, M. S. M. (2005). Acceptance model of electronic medical record. *Journal of advancing information and management studies.* 2(1), 75-92.

Jacob, R. J. K. (2000) "User Interfaces," in *Encyclopedia of Computer Science*, Fourth Edition, ed. by A. Ralston, E.D. Reilly, and D. Hemmendinger, Grove Dictionaries Inc.

Liu, C. H., Chung, Y. F., Chen, T. S., Wang, S. D. (2012). The Enhancement of Security in Healthcare Information Systems. *Journal of Medical Systems.* 36(3), 1673-1688.

Venkatesh, V., Morris, M. G., Davis, F. D., and Davis, G. B. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly.* 27(3), 425–478.

Venkatesh, V., Davis, F. D., and Morris, M. G. (2007). Dead or Alive? The Development, Trajectory, and Future of Technology Adoption Research. *Journal of the Association for Information Systems.* 8(4), 267–286.

Ying, C. L., Yu, A. H., and Ming, Y. W. (2014). Exploring Users' Intention to Use Health Information on a Bulletin Board System. *International Journal of Cyber Society and Education.* 7(1), 89-96.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly.* 13, 319–29.

Hair, J. F., Hult, G.T.M., Ringle, C.M., and Sarstedt, Marko (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* London: Sage Publications.

Hair, J. F., Hult, G.T.M., Ringle, C.M., and Sarstedt, Marko (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (2nd ed.) London: Sage Publications.

Goff, C. R. (2016). Predictors of Patient Portal Use: Patient Engagement through Meaningful Use. Doctor Philosophy, Capella University, Minneapolis

Seeman, E., and Gibson, S. (2009). Predicting Acceptance of Electronic Medical Records: Is the Technology Acceptance Model Enough? *SAM Advanced Management Journal*, *74*(4), 21-26.

Ringle, C. M., Wende, S., and Becker, J. M. (2015). *SmartPLS 3.0.* Boenningstedt: SmartPLS GmbH, Retrieved September, 5, 2018, from http://www.smartpls.com.

Hair, J. F., Ringle, C. M., and Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice.* 19, 139-151.

Henseler, J., Ringle, C. M., and Sinkovics, R. R. (2009). The Use of Partial Least Squares Path Modeling in International Marketing. *Advances in International Marketing.* 20, 277-320.

Cohen, J. (1988). Statistical Power Analysis: A Computer Program. New York: Routledge.

Adams, D. A., Nelson, R. R., and Todd, P. A. (1992). Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication. *MIS Quarterly.* 16(2), 227–247.

Bagozzi, R. P., Davis, F. D., and Warshaw, P. R. (1992). Development and test of a theory of technological learning and usage. *Human Relations*, *45*, 659-686.

Jones, A., Mitchell, L. J., O'Connor, R., Rollo, M. E., Slater, K., Williams, L. T. and Ball, L. (2018). Investigating the Perceptions of Primary Care Dietitians on the Potential for Information Technology in the Workplace: Qualitative Study. J Med Internet Res. 20 (10), e265

Aljunid, S. M., Srithamrongsawat, S., Chen, W., Bae, S. J., Pwu, R. F., Ikeda S., Xu, L. (2012). Health-Care Data Collecting, Sharing, and Using in Thailand, China Mainland, South Korea, Taiwan, Japan, and Malaysia. *Value in Health.* 15(1), S132-S38.

Madden, T. J., Ellen, P. S., and Ajzen, I. (1992). A comparison of the Theory of Planned Behavior and Theory of Reasoned Action. *Personality and Social Psychology Bulletin.* 18(1), 3-9.

Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information Systems Research.* 2(3), 173-191.

Norman, P., and Conner, M. (1996). Predicting Health-Check

Attendance among Prior Attenders and Nonattenders: The Role of Prior Behavior in the Theory of Planned Behavior. *Journal of Applied Social Psychology.* 26(11), 1010-1026.

Taylor, S., and Todd, P. A. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research.* 6(2), 144-176.

Venkatesh, V., and Brown, S. A. (2001). A Longitudinal Investigation of Personal Computers in Homes: Adoption Determinants and Emerging Challenges. *MIS Quarterly.* 25(1), 71-102.

Fleming, M. L., Barner, J. C., Brown, C. M., Shepherd, M. D., Strassels, S., and Novak, S. (2014). Using the Theory of Planned Behavior to Examine Pharmacists' Intention to Utilize a Prescription Drug Monitoring Program Database. *Research in Social and Administrative Pharmacy*. 10, 285–296.

Yoo, E. Y., and Robbins, L. S. (2008). Understanding Middle-Aged Women's Health Information Seeking on the Web: A Theoretical Approach. *Journal of the American Society for Information Science and Technology*. 59(4), 577-90.